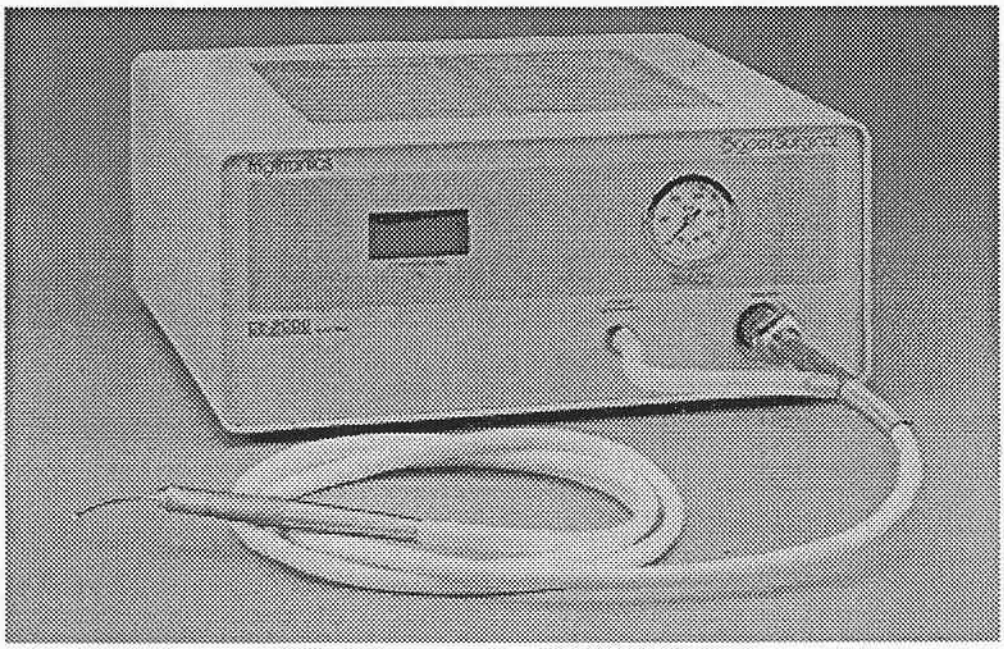
Service Manual



CE-2000™

A Low-pressure, Non-electric
Fully-exhausted Cryosurgical System
with Backlight Digital Temperature Display

frigitronics.
Manufactured by
CooperSurgical, Inc.
15 Forest Parkway
Shelton, CT 06484 USA
(800) 243-2974 (203) 929-6321
Fax (203) 926-9435

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Replacement of High Pressure Regulator

1. Remove eight (8) brown screws and two (2) brown bezels from the unit.
2. Lift top off of unit.
3. Loosen set screws in knob on regulator and remove knob.
4. Loosen nuts and remove copper pipe from regulator.
5. Loosen bracket from rear of the regulator and large brass nut in front of regulator.
6. Remove small brass nut from regulator shaft and first large brass nut and install regulator into panel.
7. Install and tighten down large brass nut.
8. Connect bracket and copper tubing.
9. High pressure stop nut must be set now. Connect console to gas supply and connect a probe into the console.
10. With console in freeze mode, turn regulator pressure up so front gauge will read approximately 625 psi.
11. Install stop nuts on regulator threaded shaft and lock in place just before contacting regulator neck.

Preventative Maintenance Procedure

What is the recommended frequency of PM intervals?

Six months

What is the average time to conduct a PM?

1/2 hour

What is the average time to conduct a repair?

Two hours

Outline what is involved in the PM of this equipment.

Verify pyrometer calibration; leak test system; freeze & defrost test of probes and system.

Provide a checklist of the PM procedure.

Temperature Display Accuracy Verification

A. Install a probe into the socket.
B. Turn console "On", depress pedal and release. This activates the digital temperature display.
C. Put probe tip in ice water.
D. Verify that temperature is 0°C ± 5°.

Leak Test

A. Turn console "On". Note: Do not install a probe in the socket for this test.
B. Take a reading from the pressure gauge in front of unit.
C. Turn console "Off".
D. Gauge should not drop more than 10 psi in one minute.
E. If pressure drops, open unit. Find and repair leak.

Freeze and Defrost Test

A. Install a probe.
B. Turn console "On".
C. Depress pedal and verify that the tip freezes and that you get a temperature of approximately -80°C in air.
D. Release foot pedal and verify tip defrost.
   Note: Probes with a red band around the spring are not equipped with a thermocouple and will not read temperature. Verify only tip freeze and defrost with these probes.

TOOLS REQUIRED

3/8" Wrench

5/8" Wrench

9/16" Wrench

1/4" Wrench

Phillips Screwdriver

Flat Screwdriver

Parts List

Reference Drawing X52794

ITEM	PN	DESCRIPTION
6	51874	Foot Pedal Assembly
17	34031	Digital Temperature Meter
18	20440	"O" Ring Probe Socket
20	51879	High Pressure Bulkhead Assembly
38	51878	ON-OFF Valve Assembly
42	52042	High Pressure Regulator Assembly
44	51881	Low Pressure Regulator Assembly
48	51882	High Pressure Three Way Assembly
68	51351	Ballast Chamber Assembly

Troubleshooting

Reference Drawing X52794

	Cause	Correction
	Leaks	
	Leaks around probe socket.	Replace "O"-ring (PN 20440) using dental pick type instrument
	Does Not Freeze	
A.	Verify that cylinders are on and on-off valve is on.	Turn cylinders or console ON.
B.	Verify adequate gas pressure is registered on harness gauge.	If low, replace tanks.
C.	Check for crimp or crushed portion of foot pedal line.	Uncrimp line or replace.
D.	Check for malfunction in footswitch.	Invert foot pedal (PN 51874), reference Item #6, and pry open dome cover. 1) Remove green input tube and verify gas flow. If none is present, the filter is clogged or the on-off valve is not functioning or the low pressure valve has malfunctioned. If gas is flowing from green input; reinstall tube. 2) Remove red output tube from valve and press down on pedal valve. Replace valve (PN 21716) if no gas is coming from the open fitting. If gas is flowing from pedal fitting, replace the red tube - this means the three way valve or the high pressure regulator has malfunctioned.
E.	Check for malfunction of High Pressure Three-Way Valve Assembly.	Remove console cover. Remove line to high pressure three-way pilot. Depress foot pedal if gas flows, reconnect line, then depress again; if valve does not function: replace valve assembly (PN 51882). Reference Item #48.

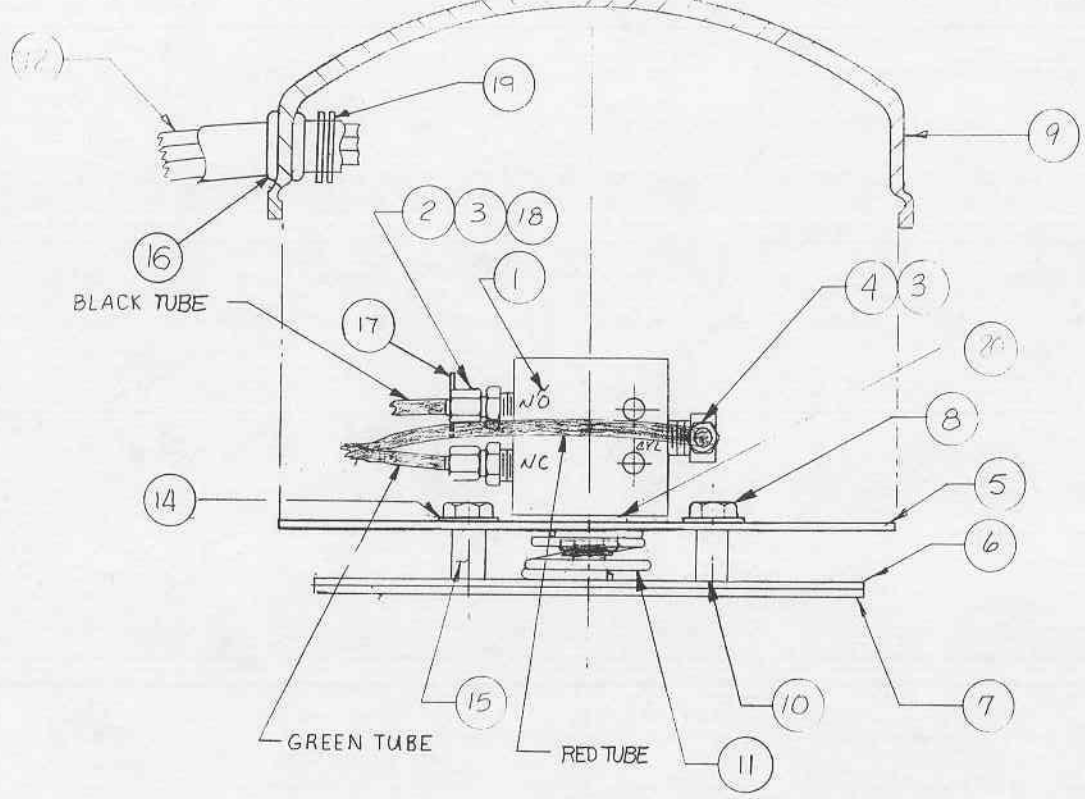
Troubleshooting (Cont'd)

	Cause	Correction
F.	Clogged inlet filter.	Shut off tank(s). Remove console cover. Remove 1/8" inlet line on inside of console. Remove high pressure bulkhead assembly (PN 51879) and replace. Reference Item #20.
G.	Check for defective on-off valve.	Remove console cover. Remove 1/8" line connector on outlet side of valve. With bottle turned on, turn valve to on - if not gas flows: replace valve (PN 51878). Reference Item #38.
H.	Malfunctioning high pressure regulator.	
	Gauge on front panel going to bottle pressure, even with regulator adjusted to full "decreased".	Replace (PN 52042). Reference Item #42.
	Does Not Defrost	
	Unit shutting down when pedal released.	
A.	Leaks in ballast chamber assemblies.	Using soap solution, check all connections for leaks. Tighten as necessary. If leaks continue, replace (PN 51351). Reference Item #68.
B.	Defective low pressure three-way valve assembly.	Remove tube from low pressure three-way valve. Depress pedal. If no gas flow, replace low pressure three-way valve (PN 51881). Reference Item #44.

Troubleshooting (Cont'd)

	Cause	Correction
	Malfunctioning Temperature Reading	
A.	Verify probe used is wired for temperature sensing. Any probe with a red band on the spring is not wired for temperature sensing.	First verify operation using a second probe with thermocouple. Connect an Ohm-meter to the end of the probe plug. Connect one lead to the shaft and the other to the gold nipple; reading should be 9-10 Ohms. If reading is correct, check temperature display wiring. If good, replace defective digital meter (PN 34031). Reference Item #17. If reading is not correct, return probe for servicing.
B.	Verify meter function.	Replace batteries. Check wiring.
C.	Verify Pressure Switch function.	Turn unit on and depress pedal. Temperature display should activate. If not, jump the NO and C connections that are wired to the "Display" battery. The display should turn on. If it does, replace the switch.

LTR.	REVISION	DATE	APP'D.
B	DELETE: ITEM 13, P/N 32868, ITEM 12 WAS: P/N 20603. ITEM 16 WAS: P/N 10917, ITEM 17 WAS: P/N 10918. REM: VIEW A	10-28-82	
C	ITEM 19 WAS: QTY. 1, ITEM 18 WAS: P/N 10836, REV. P	3-29-83	
D	ITEM 14, P/N 10916 WAS: QTY. 3	4-10-84	
E	ITEM 10 P/N 10880 WAS 10519. SWITCH N.O N.C	1-2-85	
F	ITEM 14 QTY. WAS 6, ITEM 11 WAS P/N 21698 QTY. 3	12-3-86	



NOTE
1. DO NOT PINCH TUBING BY OVER TIGHTENING TY-RAP

ITEM	QTY	PART NO.	DESCRIPTION
20	1	10922	.664 X .503 / .031
19	2	10107	TY-RAP SMALL
18	6	10966	FLAT FLANGE EYELET
17	1	10107	TIE WRAP
16	1	10939	5/16 I.D. x 7/16 GROOVE DIA. GROMMET
15	3	21714	AL. HOLLOW SPACERS #6 x 1/2 LG
14	3	10916	#10 NYLON FLAT WASHER
12	11'7"	32970	TUBE BUNDLE, FINISHED
11	1	33408	CONICAL SPRING
10	A/R	10880	LOCTITE 290
9	1	32859	COVER FT PEDAL
8	3	10040	BINDING HD. 6-32 x 5/8 LG
7	1	32867	PAD - BASE PLATE
6	1	32857-202	BASE PLATE
5	1	32858-202	SUPPORT PLATE
4	1	20337	ELBOW 1/8 NPT - 1/8 TUBE
3	A/R	20740	TEFLON TAPE
2	2	20333	MALE CONN. 1/8 NPT - 1/8 TUBE
1	1	21716	VALVE, FOOT PEDAL

BILL OF MATERIAL

MATERIAL
VENDOR:
UNLESS OTHERWISE APPROVED BY THE PURCHASING DEPARTMENT
1. Parts supplied shall be made from type of material specified on this drawing.
2. Parts supplied shall conform to all dimensions, configurations and applicable notes specified on this drawing.
3. Vendor has responsibility for selecting material size that will satisfy conditions set forth in line 2.

TYPE OF MATERIAL

ORDERING INFORMATION FOR FRIGITRONICS DIVISION ONLY

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
FRAC. DECIMALS ANGLES
.XX .XXX
±1/64 ±.01 ±.005 ±1°

FINISH

		DATE
DRAFTSMAN	D. MADER	9/25/81
CHECKER		12/3/81
MFG. ENG.		12/1/81
Q.C.		12/1/81
APPROVED		12/1/81

frigitronics. OF CONNECTICUT INCORPORATED

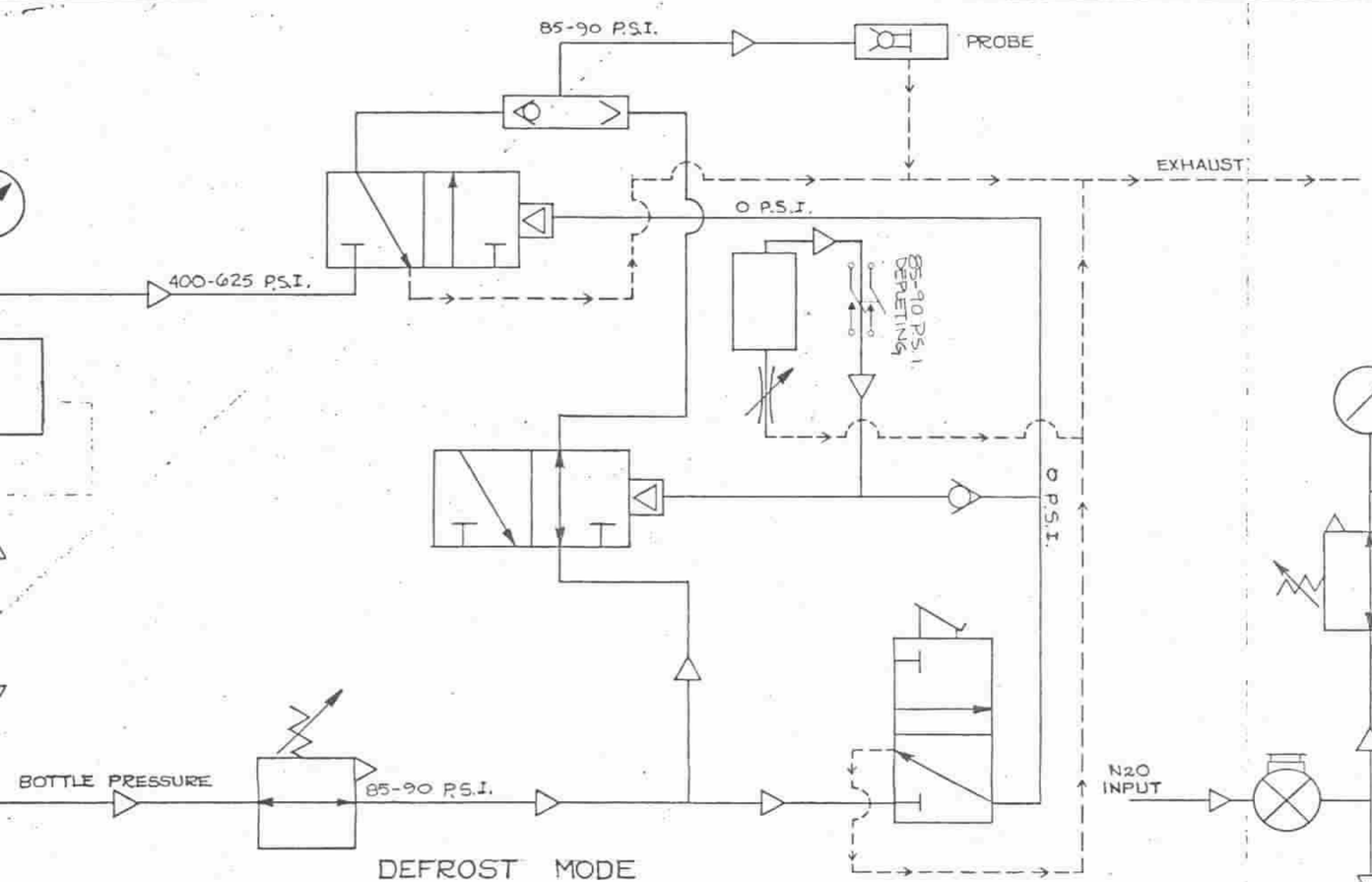
FOOT PEDAL ASSY

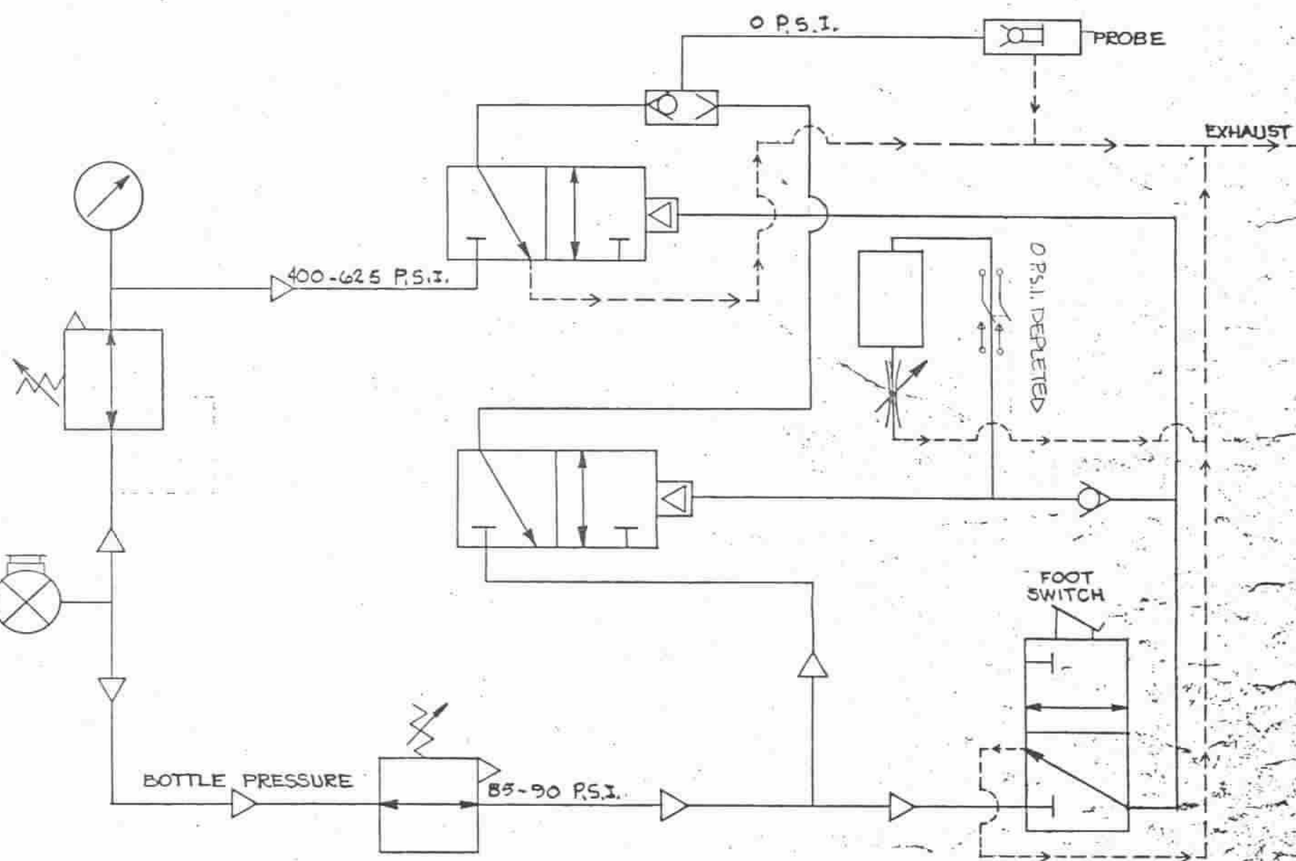
SIZE B | DWG. No 51874

SCALE 1:1 | SHEET 1 OF 1

APPLICATION	NEXT ASSY.	QTY.
92 DELIVERY SYS.	51885	1

LTR.	REVISION	DATE	APP'D.

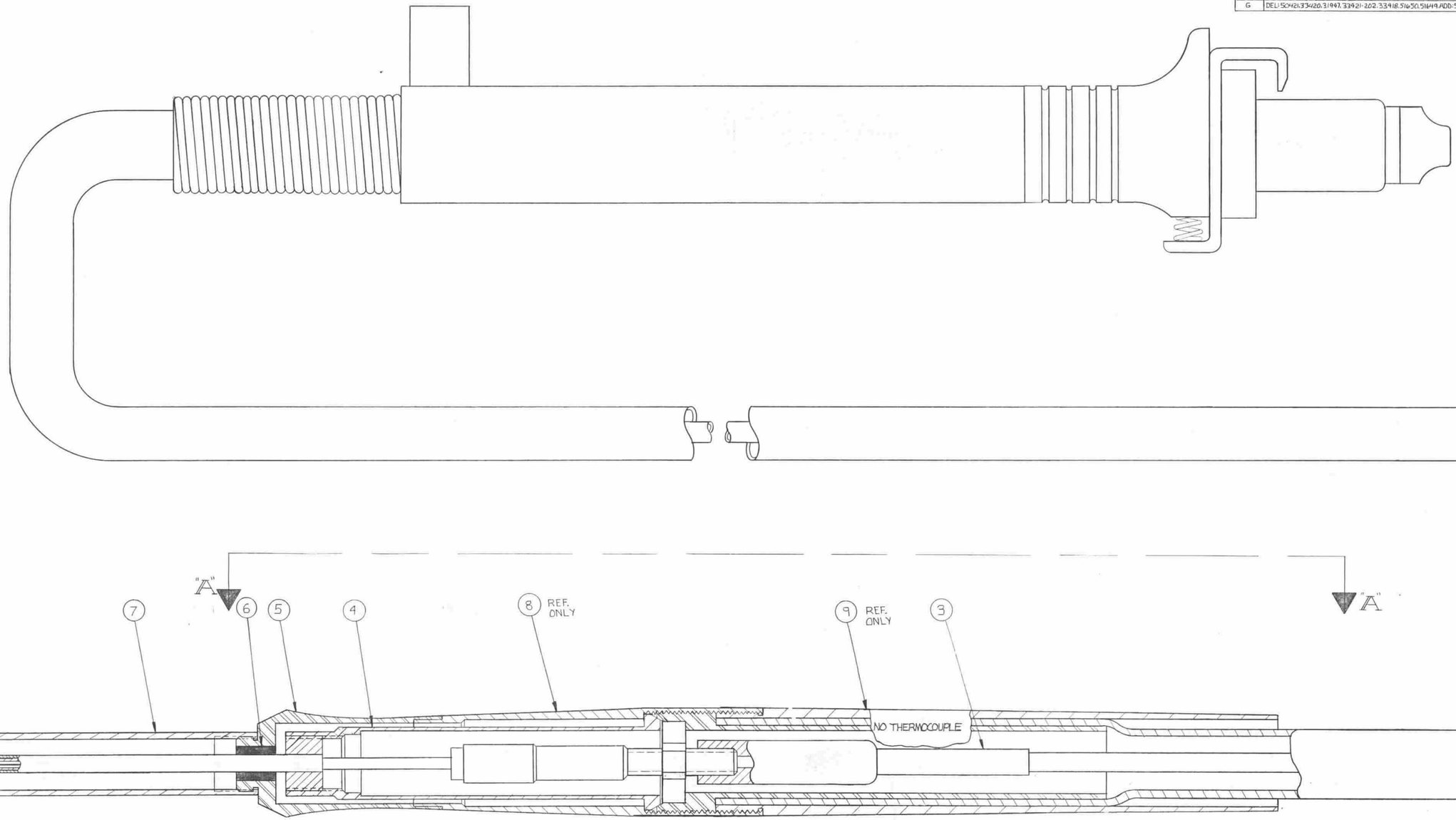




13	1	22322	PRESSURE SWITCH FOR DIGITAL DISPLAY AND BACKLIGHT
12	1	50258	SOCKET END ASS'Y

51648

LTR	REVISION	DATE	APPD
A	REVISED, SEE ECN 51648 REV. A	9-4-80	
B	ADD: "NO THERMOCOUPLE" SHOWN PICTORALLY	11-16-82	
C	ITEM 3 WAS: P/N 50198, ITEM 9 WAS: P/N 50197	1-18-83	
D	ADD: -202 TO: ITEM 2, P/N 32528 & P/N 31946	5-22-84	
E	ADD: ITEM # 12, VIEW A-A, AND NOTES 1-4	3-19-86	
F	33421 33420 33418 WERE 31946 33000 33001. DELETE SEAL WASHER 30848.	6-5-87	
G	DEL: 50421,33420,31947,33421-202,33418,51630,51619 ADD: 52301,22012,11018	1-14-88	



4.) EXPLANATION OF CAT # SERIAL Nºs
FIRST (3) DIGITS = CAT Nº
NEXT (3) OR (4) DIGITS = DATE OF MFR.
(MONTH & LAST (2) DIGITS OF YEAR.)
LAST 1 OR 2 DIGITS = THE Nth PROBE MADE FOR THE MONTH.

3.) CAT # SERIAL Nº TO BE ON ITEM# 9 AND ALIGNED WITH LETTERING ON ITEM# 8

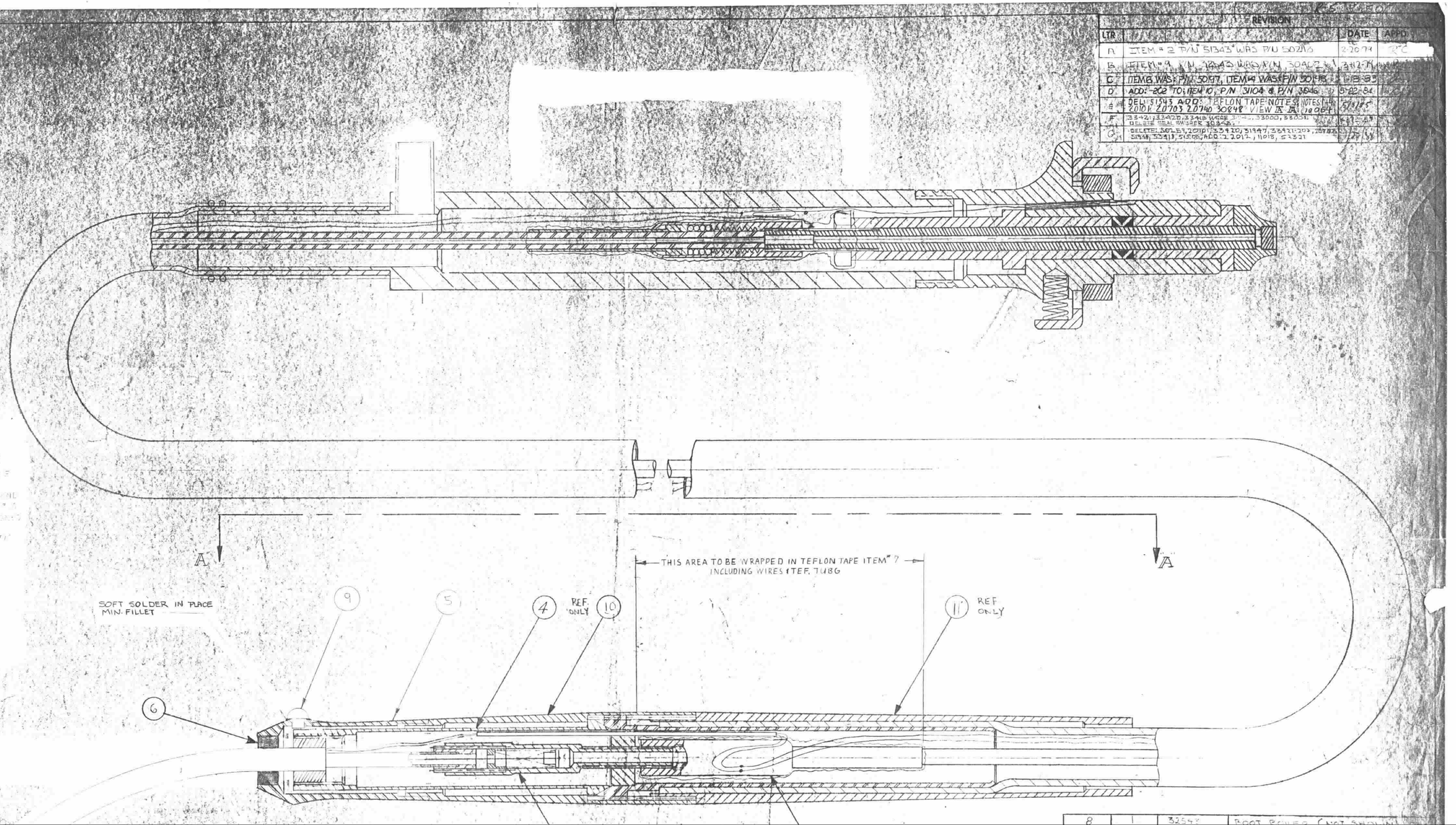
2.) LETTERING TO BE CENTERED ON ITEM#8

1.) USE STENCIL P/N 40590 ON ITEM#8

ITEM	QTY	PART NO.	DESCRIPTION
7	1	32630	SHEATH, PROTECTIVE
6	A/R	10064	BLACK RTV
5	1	32528-202	NOSE-GLASS BEAD SHOT
4	1	52307	BOILER & SPRING HSG ASS'Y
3	1	50315	DEL. LINE ASS'Y
2	A/R	11018	NOKORODE SOLDERING PASTE
1	A/R	22012	157B EUTECROD SOLDER

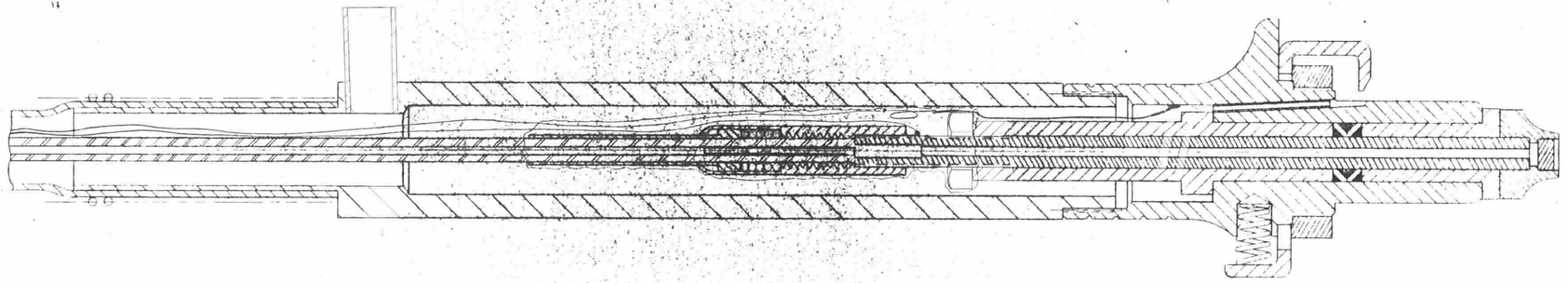
LIST OF MATERIALS

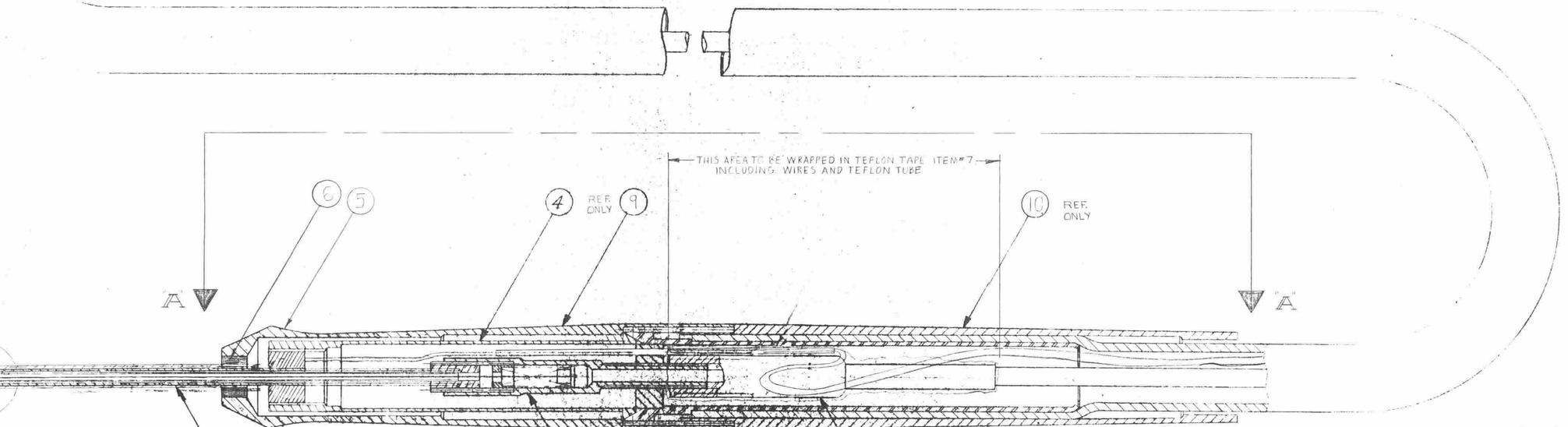
REVISION			
LTR		DATE	APPD
A	ITEM #2 P/N 51343 WAS P/N 502116	2-20-79	RC
B	ITEM #9 P/N 32545 WAS P/N 30462	3-12-79	
C	ITEMS WAS P/N 30417, ITEM #4 WAS P/N 30418	6-13-83	
D	ADD: -202 TO ITEM #10, P/N 31104 & P/N 3646	5-22-84	
E	DEL: 51543 ADD: TEFLON TAPE NOTES NOTES 4&5 ADDED ZO703 ZO740 30848 VIEW A-A, 10064	5/1/85	
F	33421, 33420, 33418 WERE 31104, 33000, 58031 DELETE SEAL WASHER 30848	6-11-85	
G	DELETE: 30151, 20101, 33420, 31947, 33421-202, 20785, 51948, 33413, 51508, ADD: 20172, 11018, 51321	7-17-85	

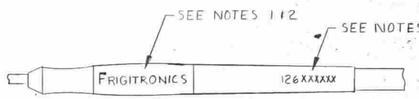


8	1	32545	ROOT POWER CMT SHOULDER

REVISION			
LTR		DATE	APPD.
A	DELETE ALL REFERENCE TO ITEM 9 WAS 30580 ADD ITEM 10	12-7-76	R.C.
B	ADD P/N 30710 INSUL. SLEEVE	2-2-83	
C	ITEM 6 WAS: P/N 50473, ITEM 4 WAS: P/N 50478	1-13-83	
D	ADD: -202 TO: ITEM 9, P/N 30368 & P/N 31946	5-22-84	
E	ADD: ITEMS 11-15, NOTES 1-4, VIEW A-A, TEF. TAPE NOTE	3-19-86	
F	33421, 33420, 33418 WERE 31946, 33000, 33001, DELETE 10845	4-3-87	
G	DEL. 50289, 20101, 33420, 31947, 33421-202, 20703, 50439, 33418, 51168 ADD: 52242, 22012, 11018.	1-13-88	







VIEW "A-A"

4.) EXPLANATION OF CAT. & SERIAL NRs
FIRST (3) DIGITS = CAT. NO.
NEXT (3) OR (4) DIGITS = DATE OF MFR.
MONTH & LAST (2) DIGITS OF YEAR
LAST (1) OR (2) DIGITS = THE NTH PROBE MADE FOR THE MONTH.
3.) CAT. & SERIAL NRs TO BE ON ITEM #10 AND ALIGNED WITH LETTERING ON ITEM #9
2.) LETTERING TO BE CENTERED ON ITEM #9
1.) USE STENCIL P/N 40589 ON ITEM #9

NOTES:

ITEM	QTY.	PART NO.	DESCRIPTION
8	1	32710	INSUL. SLEEVE
7	A/R	20740	TEFLON TAPE
6	A/R	10064	BLACK RTV
5	1	30368-202	NOSE - GLASS BEAD SHOT
4	1	52242	BOILER & SPRING HSG. ASSY
3	1	50314	DELIVERY LINE ASSY
2	A/R	11018	NOKORODE SOLDER PASTE
1	A/R	22012	157B EUTECROD SOLDER

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES FRACTIONS DECIMALS ANGLES .XX ±.01 .XXX ±.005 ±1/64 ±1°	DATE DEC. 9 1975	FRIGITRONICS INC. SHELTON, CONNECTICUT	
	DRAFTSMAN	ST. CATARACT PROBE WITH T.C.	
MATERIAL	CHECKER RMC		
CAT № 126 NEXT ASSY	FINISH	APPROVED	SIZE D DWG. No 51040
			SHEET OF

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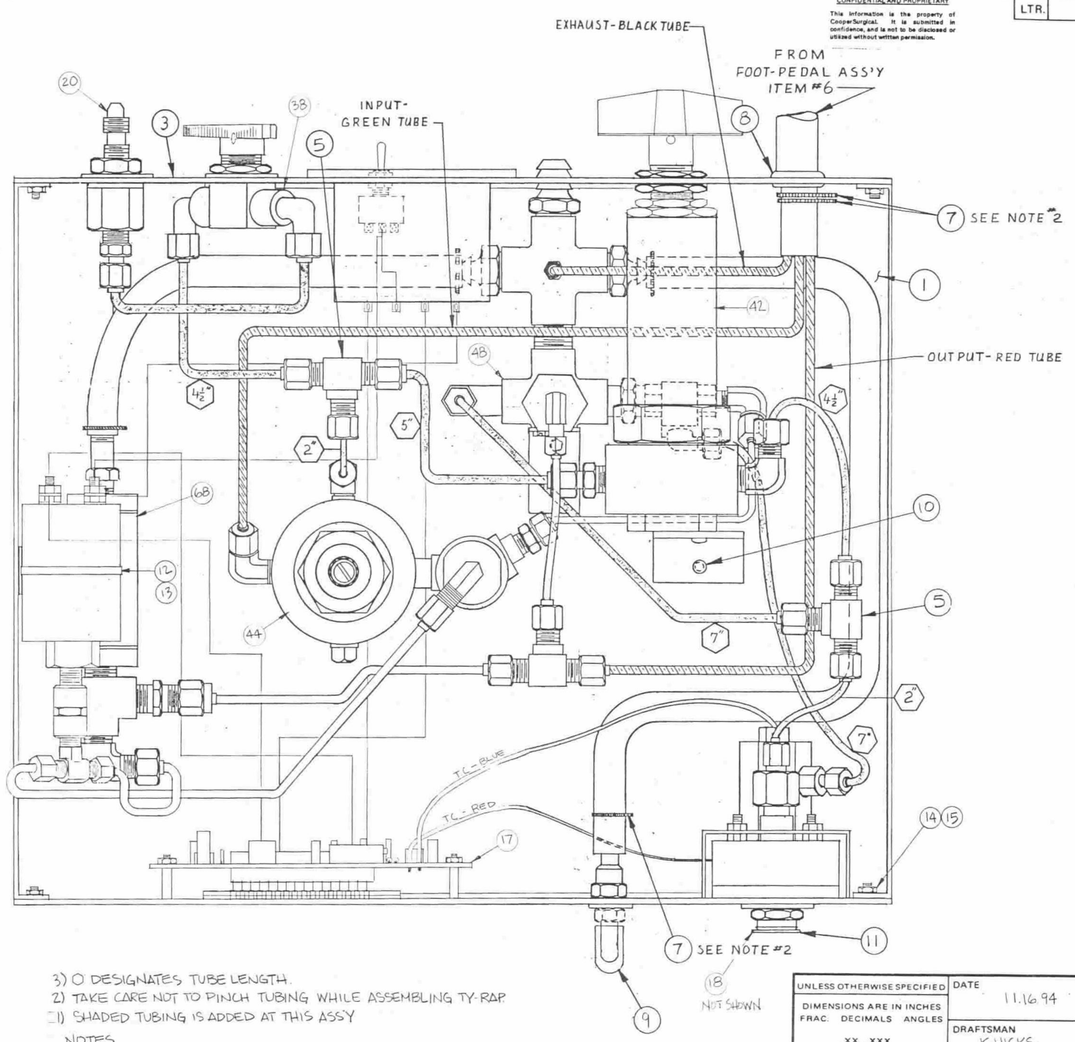
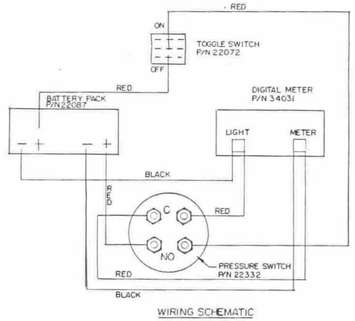
LTR.	REVISION	DATE	APP'D.





WIRING SCHEMATIC

ITEM	QTY.	PART NO.	DESCRIPTION
15	8	10026	6-32 NUT
14	8	10172-6	INTERNAL LOCKWASHER
13	1	21723	TY-RAP
12	1	21724	TY-RAP BASE
11	1	20486	CAP PLUG
10	1	10935	SELF TAPPING SCREW
9	1	21704	CAP PLUG
8	1	10939	GROMMET
7	3	10107	TY-RAP
6	1	51874	FOOT PEDAL ASSY
5	2	20353	UNION TEE
4	32"	20022	1/8" COPPER TUBE
3	1	52796	REAR PANEL ASSY
2	1	52795	FRONT PANEL ASSY
1	1	52797	LOWER CASEMENT ASSY

LIST OF MATERIALS

3) ○ DESIGNATES TUBE LENGTH.
2) TAKE CARE NOT TO PINCH TUBING WHILE ASSEMBLING TY-RAP.
1) SHADED TUBING IS ADDED AT THIS ASSY.

NOTES

CE-2000 DELIVERY SYSTEM	52793	
APPLICATION	NEXT ASSY.	QTY.

UNLESS OTHERWISE SPECIFIED	DATE 11.16.94	CooperSurgical
DIMENSIONS ARE IN INCHES FRAC. DECIMALS ANGLES .XX .XXX ±1/64 ±.01 ±.005 ±1°	DRAFTSMAN K.HICKS	CE-2000 PANEL CONNECTION ASSY
MATERIAL	PROJ. ENG.	MFG. A. Lozano
FINISH	APPROVED GP 11/12/95	Q.C. 12/20/94
	SIZE C	DWG. No. X52794
	SCALE 4	SHEET 1 OF 1

MILFORD BLUEPRINT INC.